The Quality-Quantity Transition in Ghana: Chance and Choice
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1 Introduction

The transition from high to low fertility, and from low levels of investment in children's education to high levels of investment, has been described as a quantity-quality transition. This transition is central to the process of economic development, in that when fertility falls and schooling levels rise, one can expect to see subsequent reductions in the rate of growth of the labor force and subsequent increases in the level of human capital per worker (see Montgomery et al. forthcoming). In studying the quantity-quality transition, economists have often assumed that fertility and schooling outcomes are the result of deliberate family strategies, and they have given comparatively little attention to imperfect fertility control or to the schooling outcomes that can be only partly determined by family decisions. As will be seen, in our data such departures from desired fertility and schooling strategies are common, and their implications need to be better understood.

This paper examines the situation in southern Ghana, a setting in which fertility decline is only recently underway and in which new dimensions of children's schooling are attracting the attention of parents. We focus first on the phenomenon of unintended fertility, which in this context is mainly mistimed rather than unwanted fertility. Where schooling is concerned, we study two short-term aspects of schooling decisions that appear to have important long-term consequences—delays

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in primary enrollment, and grade repetition at the primary and junior secondary levels. A child's readiness for school may reflect a host of factors lying outside parental control, such as health and emotional or cognitive maturity; likewise, a child's performance in school may be dependent on his or her innate abilities, the vagaries of classroom dynamics in a particular grade, and other factors that parents can only partially control. As will become clear, late enrollment and grade repetition—events that might seem to be transitory and of no more than minor importance—-are associated with long-term deficits in educational attainment.

In the ideal study, with such empirical regularities established, one would go on to determine whether unintended fertility is *causally* associated with unintended departures from educational strategies.[1] Might it be that families experiencing unintended births face tightened resource constraints and, as a consequence, find it necessary to delay the enrollment of their children? Might they encounter continuing difficulties in sustaining their children's schooling? To address such questions, a study would have to be the product of a fully longitudinal design at the level of families and children. The data to be described here are not sufficiently rich in the longitudinal dimension to permit such causal effects to be estimated.

Nevertheless, the data at hand can shed some light on the issues. As will be seen, unintended fertility is concentrated in the better-off socioeconomic groups in the study population. This puts the resource scarcity hypothesis, at least in its simple form sketched above, in some doubt. In our conclusions, we will return to the question of resource scarcity and will offer an expanded interpretation of the hypothesis.

2 Data and Community Environment

The data are drawn from a three-year project conducted in Ghana from July 1997 to June 2000, which explores the family-level linkages between fertility and children's schooling in a society that is on the brink of demographic transition. The project is the result of an on-going collaboration between the Population Council and the University of Cape Coast, Ghana. The schooling research follows a longitudinal design at the community level: an initial survey went into the field in mid-1997 and a follow-up survey was carried out in the same communities in late 1999 and early 2000. This report uses only the data from the second survey round. In this round, individual interviews took place with 320 women, the sample being divided equally across the four survey sites, giving 80 women per site.

To understand the quantity-quality transition in southern Ghana, one needs a sense of the structure of the Ghanaian school system. Here, primary schooling is

[1] See the analysis in Montgomery et al. (1997).

meant to begin when a child is 6 years of age, and upon completion of six primary grades, the child should progress almost automatically to junior secondary schooling. There is no national examination at the end of primary, although children are sometimes asked to repeat primary grades if their performance or attendance has been poor. At the end of the three-year cycle of junior secondary schooling, the Basic Education Certificate Examination (BECE) is administered on a nationwide basis. The score that a student earns on this examination, when taken in combination with an assessment of performance over the school year, is the major determining factor in the progression to senior secondary schooling.

The current form of the Ghanaian school system was put into place beginning in 1987; it replaced an earlier system in which the counterpart to junior secondary schooling was a four-year cycle of middle schooling. In the data to be described below, most of the adult respondents received their schooling in the pre-reform era, whereas most (although not all) of the children progressed through the system as it is currently configured.

In the public system of basic education—the primary and junior secondary levels of schooling—schooling is meant to be provided free of tuition. Nevertheless, Ghanaian parents face a variety of fees associated with schooling, ranging from fees levied by local parent-teacher associations to special sports fees and related charges. When evaluated in relation to annual income per adult, these charges may appear to be low or even trivial. But in rural Ghana, and in some low-income urban communities, the need to pay such fees in cash and on time can impose a considerable burden on parents. If the demand for schooling is fragile in any case, the imposition of fees can tip the balance between enrollment and withdrawal for low-income families.

To assess the strength of demand for schooling in a range of socioeconomic settings, we selected four communities in the Greater Accra, Central, and Western regions. Abrafo-Odumasi is a Denkyira agricultural community with two primary schools and a junior secondary school (JSS). It is the most rural of the study areas, exemplifying a socio-economic environment in which children's labor is valuable and the opportunity costs of schooling are therefore high. The Denkyira are matrilineal, and relatives other than a child's natural parents, such as a mother's brother, will often play a role in schooling decisions. In rural Ghanaian settings such as this, parental motivations for schooling remain somewhat thin, and after the primary school years the opportunity costs for parents of further schooling tend to loom large.

Mankessim is a marketing and trading community located along the main road from Accra to Cape Coast. In the past, Mankessim was mainly Fanti, a matrilineal ethnic group, but it now contains a mix of ethnic groups owing to considerable inmigration. Here there are 5 primary schools, 3 JSS only and 6 combined primary

and JSS schools. In such marketing centers, parents are exposed to some of the economic returns to schooling evident in the local, highly heterogeneous labor market. Nevertheless, children's labor remains valuable and school officials say that on the main market days, attendance is decidedly lower, as children are taken from school to help their mothers sell their wares and run errands. Because Mankessim is a large community of at least 8,000 population, we selected for study one well-defined neighborhood of some 200 households containing the largest cluster of schools.

Torkuse is an important marketing and trading center in the larger urbanized community of Kasoa. The main ethnic group here are the Ewe, who are patrilineal. There are 2 primary schools and 2 JSS schools in Torkuse, both of which are public.

At the upper end of the rural-to-urban continuum is Takoradi, a city of some 100,000 inhabitants that is an hour's drive from Cape Coast, within which we have selected a middle class estate sector for study. This population is highly urban and heterogeneous, although the dominant ethnic groups are matrilineal Akan (mainly of the Fanti and Ahanta ethnic sub-groups). The city of Takoradi contains some of Ghana's best senior secondary schools as well as some lesser schools that are nevertheless among the best in the region. In Takoradi, guided by our interest in the motivations of the middle class, we identified the Efiakuma housing estates as being most appropriate for our purposes. The housing estates are organized by a state housing authority and were originally built for workers who were employed in constructing the Takoradi harbor. The members of the Efiakuma community are mainly salaried workers with some representation of elites.

3 Fertility: Total and Unintended

We begin by describing levels of unintended fertility in the study population. Unintended fertility is derived from a woman's answer to the standard survey question, "At the time you became pregnant with [NAME], did you want to become pregnant *then*, did you want to become pregnant *later*, or did you *not* want to become pregnant *at all*?" The question is asked on a birth-by-birth basis. As discussed in Montgomery et al. (1997), the question is designed to take the woman's thinking back to the time of her pregnancy. Nevertheless, the responses are likely to be affected by subsequent rationalization, with the result that births that were unwanted at the time, or pregnancies that occurred sooner than desired, would be reported retrospectively as having been fully intended.

Given this expectation, we find surprisingly high average levels of unintended fertility in our study sites. To be sure, no more than trivial percentages of women reported that any of their pregnancies was unwanted, but significant percentages

Table 1: Percentage of Own Births Mistimed

	Percentage Mistimed
Birth order	
First births	37.0
Higher-order births	20.4
Preceding Interval, parities 2 and above	
Under 2 years	27.5
2 years	20.0
3 years	19.2
4 years	12.7
5 years	22.0
6 or more years	18.5
Mother's Age at Birth	
Under 20 years	52.3
20–24	27.1
25-29	18.1
Mother's Schooling	
No schooling	19.5
Any primary school	32.9
Any middle or JSS	30.1
Any senior secondary	31.8
Household SES	
In poorest third	24.3
In upper two-thirds	26.8
Community	
Abrafo-Odumasi	14.3
Mankessim	12.4
Takoradi	52.7
Torkuse	26.9

Note: Figures based only on woman's own births

of these pregnancies were reported to have been mistimed, that is, the pregnancy would have been desired later. Table 1 presents differentials in mistimed fertility according to the explanatory categories that we will use in our multivariate analysis.

As can be seen, some 37 percent of first births were reported to have been mistimed, as against roughly 20 percent of higher-order births. Consistent with this is the higher percentage of births reported to have been mistimed among mothers who were younger than 20 at the time of the birth. Also evident is a tendency for women to report births as mistimed when they followed short inter-birth intervals (of less than 2 years).

The differentials by mother's schooling level also merit attention. Note that women without schooling are comparatively unlikely to describe births as mist-

imed, with fewer than 20 percent doing so by comparison with over 30 percent for women with higher levels of schooling. In the most rural of the communities—Abrafo-Odumasi—only 14 percent of births are said to have been mistimed, whereas in Takoradi, the most urban setting, over 52 percent are described in this way. Interestingly, these figures seem to be the product of educational and community differences rather than a reflection of generally higher socioeconomic standing. A socioeconomic index, which distinguishes between the poorest third and the upper two-thirds of households, shows little explanatory power in the bivariate analysis.[2]

Table 2 provides multivariate estimates of total fertility and the likelihood that a birth will be described as mistimed. In the case of total fertility, the base for the analysis is all women with data on children ever born and the explanatory variables shown in the table. The method employed here is that of ordered-probit analysis, with a correction to the standard errors of the coefficients for within-community random effects. There are 307 women in this analysis. Where mistimed fertility is concerned, the analysis base is births—there are 832 in total—and we apply a correction for random effects at the household and community levels. The method employed for this analysis is simple probit. Note that four explanatory covariates—the mother's age at birth, an indicator for first birth, and a pair of birth interval measures—enter only the analysis of mistimed fertility.

The results on fertility can be better understood if we focus on a set of statistically significant covariates (woman's schooling and community) and examine changes in the distribution of completed fertility as the covariate in question is varied. These are "adjusted" estimates in the sense that the effects of other covariates are held constant, and the fertility distribution is predicted for a woman of age 45 so as to approximate completed fertility. As shown in the left panel of Figure 1, the completed fertility of women with secondary schooling (the darkest bars) is clearly concentrated at the low parities, with the mode being 3 children. By contrast, for women with no schooling (the lightest bars), the fertility distribution is shifted upward, with the mode being 5 children and significant proportions of women predicted to have 6 or more children. The community differences in fertility are less pronounced, on the whole, with the greatest difference evident in the levels of fertility predicted for the rural village of Abrafo-Odumasi (the omitted community in the multivariate analyses) and the lower fertility levels predicted for Takoradi, the most urban of the sites. The distributions of completed fertility by

[2]Using data on the quality of housing, access to piped water, sanitary methods of waste disposal, access to electricity, and ownership of a working set of consumer durables, we devised an index of the household's relative socioeconomic position. Our approach was to apply the method of principal components to these disparate individual indicators, and then to rank households according to the principal components score. We distinguished between households falling in the lowest third of the sample on these scores and those in the upper two-thirds.

Table 2: Estimates of Total and Mistimed Fertility: Probit Estimates

	Total (N=307 women)	**Mistimed** (N=832 Births)
Birth-Specific Characteristics		
Mother's Age at Birth		-.014
(Robust $\|z\|$-statistic)		(0.61)
First birth		.324
		(2.24)
Preceding birth interval		-.140
		(1.26)
Preceding interval, squared		.014
		(1.82)
Woman's Characteristics		
Woman's Current Age	.930	-.495
	(2.37)	(1.11)
Age squared	$-.19 \cdot 10^{-1}$	$.10 \cdot 10^{-1}$
	(1.78)	(1.05)
Age cubed	$.14 \cdot 10^{-3}$	$-.71 \cdot 10^{-4}$
	(1.53)	(1.04)
Not currently married	-.491	.175
	(2.63)	(1.32)
Farming occupation	-.074	-.251
	(0.38)	(1.88)
Any primary school	.197	.006
	(1.82)	(0.05)
Any middle or JSS	-.236	.230
	(1.78)	(1.67)
Any senior secondary	-1.086	.270
	(4.51)	(1.21)
Household and Community Characteristics		
Household in poorest third	.144	.259
	(2.83)	(1.09)
Mankessim	-.459	-.250
	(3.52)	(5.71)
Takoradi	-.647	1.188
	(4.23)	(8.82)
Torkuse	-.588	.470
	(3.50)	(4.02)

Note: Ordered-probit cut points not shown.

Figure 1: Completed Fertility by Mother's Schooling (left panel) and Community (right panel)

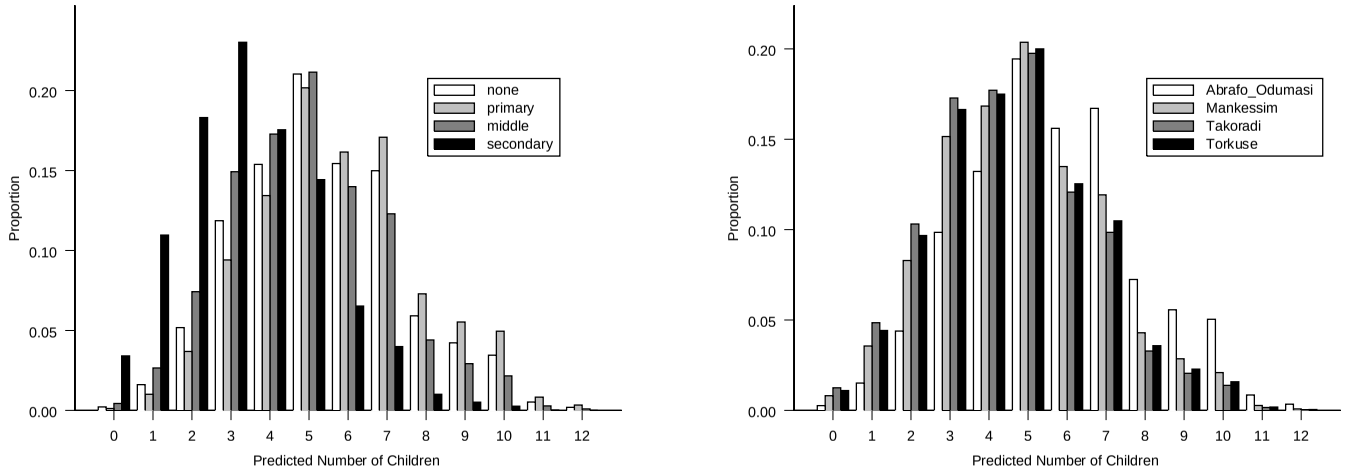
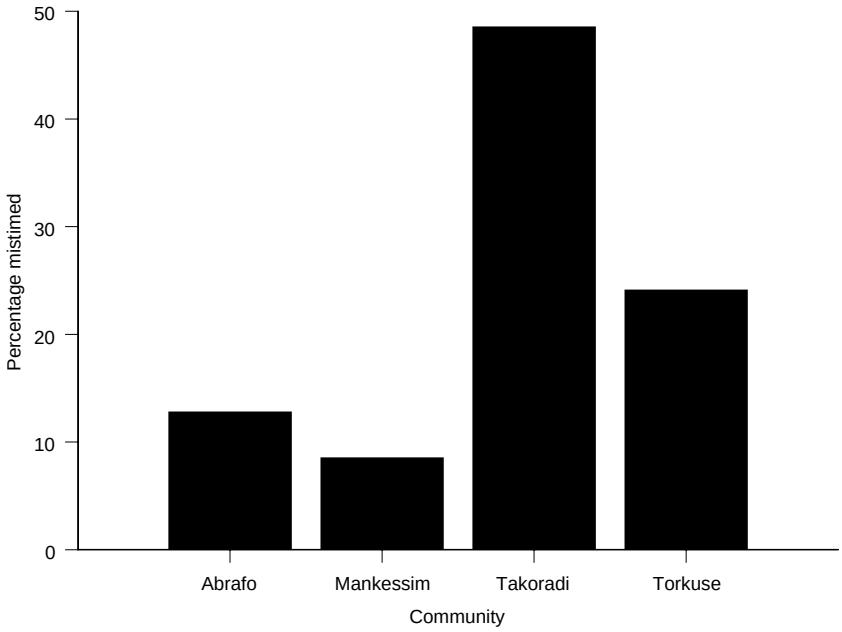


Figure 2: Predicted Proportion of Births Mistimed, By Community



community are shown in the right panel of the figure.

The second column of Table 2 presents the analysis of the likelihood of mistimed fertility. These estimates are generally in line with the bivariate associations of Table 1. First births, for example, are significantly more likely to have been mistimed; there is a negative association between mother's age and mistimed fertility, and also (for births higher than the first) a negative association between the length of the preceding birth interval and the likelihood that the birth would be described as mistimed.

Perhaps the most striking finding is the large effect of community of residence with other factors held constant. Figure 2 presents the adjusted community effects. These differ surprisingly little from the raw, unadjusted effects seen in Table 1. Once again, reports of mistimed fertility are found to be most likely in Takoradi, the most urban of the study sites. Here, almost 50 percent of all births are estimated to have been desired later, with all other factors controlled.

If they apply more broadly in southern Ghana, such findings would present a challenge to the rural orientation of family planning service delivery strategies. To

judge by the results presented here, unintended fertility is more an urban than a rural phenomenon. To express the point in another way, the likelihood that a birth will be described as mistimed is higher in the communities where fertility overall is lower. We will return to this point in our conclusions.

4 The Demand for Schooling

We now turn to the "quality" dimension of the quantity-quality transition, and examine the determinants of children's schooling. The analysis is based on the survey data collected from 320 women, which includes detailed information on the educational histories of their children. For each child of age 6 and above, the individual survey inquired into attendance at the primary, junior secondary and senior secondary levels, with probes to determine grade repetition, transfers among schools, and supplemental instruction.[3]

The baseline models of Table 3 include a set of child-specific factors, characteristics of the mother, and characteristics of the household and community. We take account of the sex of the child, his or her age, and whether the child's father still resides in the household. We have included children fostered into the household in this analysis, giving a base of 970 children of ages 6 and above, and distinguish the fostered children from the woman's own children (and those of her spouse, if she has a current spouse) by means of a dummy indicator variable. The woman's characteristics include her age, marital status, and education. As in the analyses of the previous section, we include a measure of household socioeconomic standing (whether the household falls in the poorest third on a socioeconomic index) and community of residence.

The completed schooling model in the first column of Table 3 is based on the level of schooling completed by the child as of the date of the sample survey. In this model, the child's age serves mainly to establish an upper bound on educational attainment as of the survey date. A child of 10 years of age, for example, could not have completed the full course of primary schooling, whereas a child of 13 years could have done so, provided that he or she enrolled at age 6 and repeated no primary grades. The completed schooling model is estimated by the ordered-probit method with a correction for family and community random effects. The current enrollment model, shown in the second column, is a simple probit with the same kind of correction applied to the estimated standard errors.

Although the gap between the schooling of boys and girls has been decreasing in southern Ghana, we find evidence that girls remain somewhat less likely than boys to be enrolled (the "female" coefficient in the second column of Table 3 is

[3]Montgomery et al. (2000) examines the determinants of supplemental instruction.

Table 3: Completed Schooling and Current Enrollment: Probit Estimates

	Completed Schooling (N=970 children)	**Current Enrollment** (N=965 children)
Children's Characteristics		
Female	-.235	-.207
(Robust $\|z\|$-statistic)	(2.19)	(1.79)
Child's current age	.816	2.423
	(6.69)	(5.78)
Age squared	$-.22 \cdot 10^{-1}$	-.170
	(2.69)	(6.31)
Age cubed	$.13 \cdot 10^{-3}$	$.34 \cdot 10^{-2}$
	(0.74)	(6.31)
Child's father in household	.483	.277
	(2.41)	(1.68)
Child is fostered	-.108	.338
	(1.48)	(2.48)
Woman's Characteristics		
Woman's Current Age	.001	-.010
	(0.20)	(0.72)
Not currently married	.215	.143
	(1.21)	(0.50)
Any primary school	-.133	-.091
	(1.09)	(0.50)
Any middle or JSS	.346	.289
	(4.11)	(1.77)
Any senior secondary	.563	.555
	(6.86)	(3.39)
Household and Community Characteristics		
Household in poorest third	-.155	-.058
	(1.59)	(0.65)
Mankessim	.167	.355
	(4.28)	(4.90)
Takoradi	.036	.079
	(1.81)	(1.54)
Torkuse	-.343	.031
	(12.66)	(0.97)

Note: Ordered-probit cut points not shown.

negative and weakly significant) and remain less likely to progress through the school system (as evident in the significant coefficient in the completed schooling model). The presence of the child's father in the household is associated with higher educational attainment, making a statistically significant difference in the case of the completed schooling model. Fostered children are not distinguishable from own children in the completed schooling model, but appear more likely to be currently enrolled.

As in the analysis of fertility, we see strong evidence of the influence of mother's education on the educational prospects of the children. Women who themselves have been to the junior secondary or middle school level, or who have progressed beyond that level, are evidently more likely to support schooling investments for their children. These are positive inter-generational feedbacks, by which educational investments in one generation of girls have, when those girls become mothers themselves, a positive influence on educational investments in the next generation.

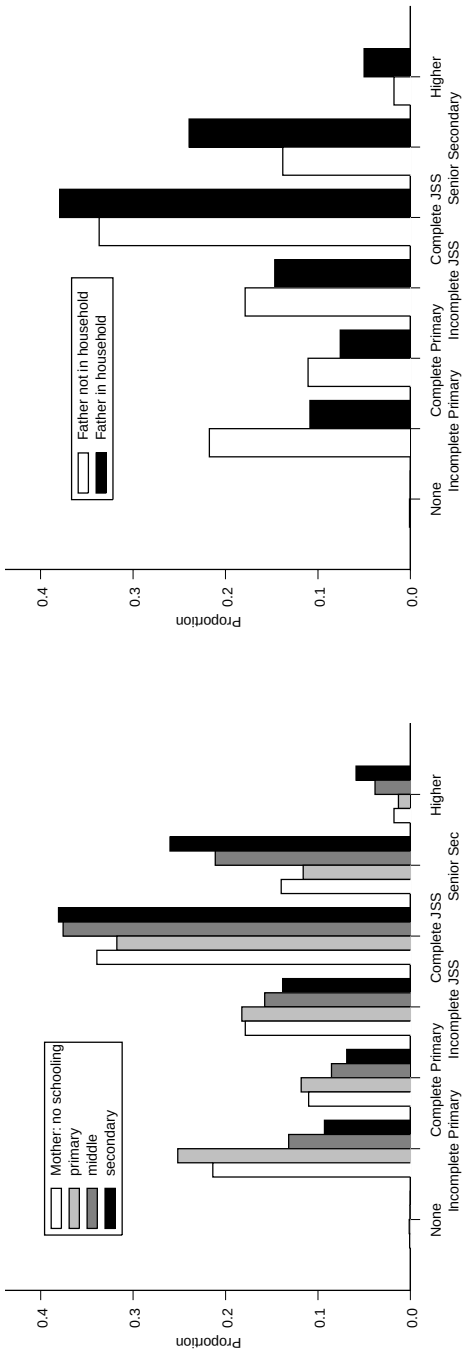
The first panel of Figure 3 shows the extent of such inter-generational feedbacks. Here, we predict the distribution of educational attainment for children of age 18, and show how that distribution varies with the educational attainment of the mother. The differences are most clearly apparent in the proportion of children predicted to achieve senior secondary schooling or higher schooling. Children of mothers with secondary schooling (the darkest bars) are much more likely to progress to secondary schooling themselves (some 27 percent are predicted to do so), whereas less than 15 percent of the children of women without schooling are predicted to attain the senior secondary level.

A similar analysis of the effects of father's presence in the household is depicted in the second panel of Figure 3. Comparison of children with and without fathers in the household suggests that the presence of the father has a strongly positive influence on educational investments. The causal role of father's residence may be somewhat overstated in this figure. The father's presence doubtless reflects a host of factors related to the longer-term availability of resources. But non-resident fathers can also play an continuing role. In other analyses, not shown here, we have investigated the sources of advice and financial support for children entering the junior secondary and senior secondary levels of schooling. Even when the fathers no longer reside in the household, they are often described (by the mothers) as maintaining a role in schooling decisions and making some financial contributions.

Delayed Entry

We now turn to aspects of schooling that may be less subject to parental control, or in which parental decisions at a point in time may have unforseen longer-run

Figure 3: Completed Schooling by Mother's Schooling (left panel) and Presence of Father (right panel)



consequences. We begin by examining the implications of delays in enrollment. As will be recalled, Ghanaian children are meant to enroll in Primary 1 when they are 6 years of age. In our sample, however, 10–25 percent of children (depending on community) do not enroll until they are 7–9 years old. To be sure, almost all children (over 95 percent) eventually attend primary school, and enrollment is largely complete by age 9.

If delays in enrollment are so short-lived, why might they have longer-run consequences? We can identify three linkages. First, children who enroll late will be older than their peers at each grade and level of schooling. As children age, the opportunity costs of schooling—that is, the potential contribution that children might make in the labor market—begin to loom larger. Hence, delays in enrollment may, over time, be expressed in lower levels of completed education. We would argue that the effect is largely one of unforseen consequences in parental decisions.

Second, when asked why their children enrolled late, the respondents often said that the children were simply not ready to attend Primay 1 with their agemates (results not shown). The children were described as immature, or as too frail to begin their schooling. To some extent, physical immaturity might reflect the cumulative effects of poor child health. One might therefore interpret readiness for school as reflecting factors that lie outside direct parental control.

Third, delays in primary enrollment may be a signal of weak parental attachment to schooling. Children who enroll later may have parents who are unconvinced of the benefits of schooling, or who are more sensitive to its opportunity costs. According to this view, enrollment delays are simply point-in-time expressions of longer-lasting parental attitudes. This is a selectivity hypothesis. Late enrollment is not posited to have any direct causal influence, but rather to reflect unmeasured parental attitudes that induce both late enrollment and lower eventual educational attainment.

Table 4 presents the statistical associations between late enrollment and completed schooling net of other confounding factors. Here, we restrict the sample of children to those who are age 10 or older. As noted above, by these ages enrollment in Primary 1 is largely complete. Nevertheless, the children who enroll late (almost all of whom enrolled at age 7 or 8) exhibit sharply lower levels of educational attainment. The analysis does not enable us to say whether the effect is causal or the product of selection on children's traits and parental attitudes, but the association with completed schooling is clearly a powerful one.

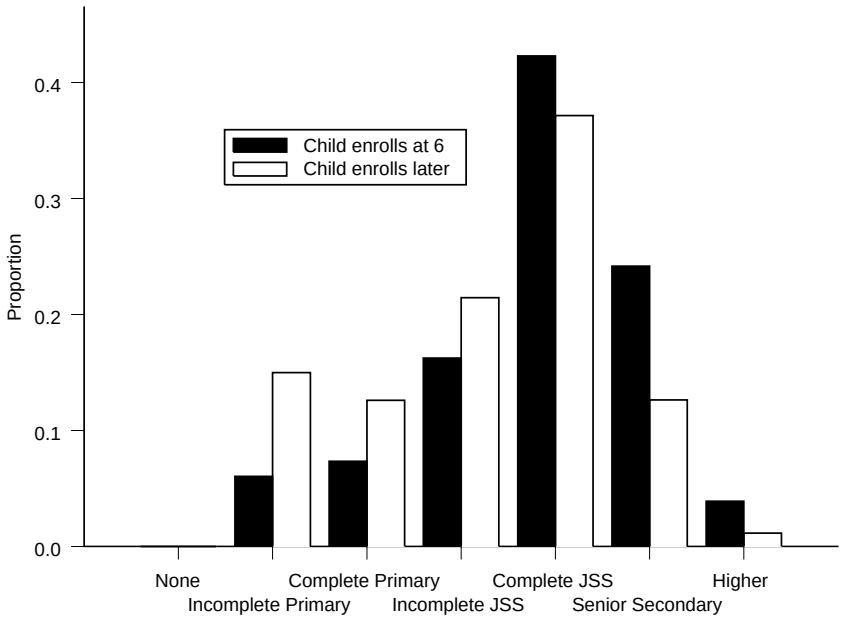
The strength of this association is depicted in Figure 4, which shows the distribution of completed schooling for children of age 18, with the predictions based on the estimates of Table 4. Children who enroll in Primary 1 on time (see the darker bars) are considerably more likely to proceed to the senior secondary and higher levels of schooling than those whose entry was delayed. They are also more likely

Table 4: Implications of Delays in Primary Enrollment

	Completed Schooling (N=685 children age 10 and older)
Children's Characteristics	
Delay in Primary Enrollment	-.556
(Robust $\|z\|$-statistic)	(6.03)
Female	-.094
	(0.59)
Child's current age	3.663
	(6.38)
Age squared	-.163
	(4.82)
Age cubed	$.24 \cdot 10^{-2}$
	(3.90)
Child's father in household	.396
	(2.29)
Child is fostered	.037
	(0.26)
Woman's Characteristics	
Woman's Current Age	.002
	(0.47)
Not currently married	.082
	(1.12)
Any primary school	-.057
	(0.47)
Any middle or JSS	.479
	(7.95)
Any senior secondary	.768
	(6.95)
Household and Community Characteristics	
Household in poorest third	-.167
	(1.37)
Mankessim	.384
	(12.30)
Takoradi	.070
	(2.19)
Torkuse	-.193
	(9.53)

Note: Ordered-probit cut points not shown.

Figure 4: Predicted Distribution of Children's Completed Schooling, by Timing of Enrollment in Primary School



to complete junior secondary training.

Grade Repetition

In our sample, of the children who are old enough to have completed primary schooling (age 14 or older), and who attended primary, some 24 percent repeated at least one grade during their primary school years. Among children who are old enough to have completed junior secondary or middle school (those of age 17 and older), and who attended JSS or middle school, about 10 percent repeated a grade during junior secondary.

A multivariate analysis of the determinants of repetition (not shown here) uncovers relatively few of the determining factors. At the primary level, girls are less likely than boys to repeat a grade. At the junior secondary and middlel school level, however, we can identify no clear determinants of repetition. Evidently, the likelihood of repetition is mainly due to child-specific and school-specific factors, or to

their interactions, which are not well measured in these data. It is likely that such factors also lie partly outside parental control, at least to the degree that they are the product of children's innate abilities to learn and specific classroom dynamics.

As Table 5 shows, repetition of primary or JSS grades is associated with significant reductions in the likelihood of progression to the next level of schooling. In analyzing progress from primary to the junior secondary level (the first column of Table 5), we have restricted the analysis to children age 14 and older who attended primary, giving a margin of 2 years beyond the minimum of age 12. There are 484 such children. In the case of progression from junior to senior secondary (the second column of Table 5), we limit the analysis to children aged 17 and older who attended junior secondary. Recall that a child who enrolls in Primary 1 at age 6 should progress to junior secondary by age 13, in the absence of repetition. A child entering the JSS level at 13 should complete that level by age 15.

In each case, the estimated coefficient on repetition is negative, statistically significant, and large in magnitude. For progression to junior secondary, we predict that if no primary grades are repeated, over 88 percent of children will progress to JSS. If a grade was repeated in primary school, however, the predicted likelihood of progression falls to 67 percent. For progression to the senior secondary level, we find similar results. If no junior secondary grade was repeated, some 46 percent of children are predicted to attend senior secondary. By contrast, when a junior secondary grade was repeated, we predict that only 14 percent of children will progress.

5 Conclusions

At the outset, we argued that in important aspects, fertility and schooling outcomes are the product of both choice and chance—that is, they result from deliberate family strategies and also from circumstances that are difficult to predict and control. Unintended fertility is an expression of imperfect control over reproduction. Enrollment delays and grade repetition may likewise be produced by factors that resist full parental control.

A skeptic might dismiss these departures from family strategies as being no more than the inevitable random "noise" that surrounds the outcomes of family strategies. Perhaps so—but as we interpret the findings, there is evidence of larger and more durable effects than a skeptic might have anticipated. The prevalence of mistimed fertility is quite high in some of the study communities, and even in the rural villages, a not inconsiderable percentage of births are mistimed. Even in a numerical sense, therefore, unintended fertility merits attention.

In the schooling analyses, we have seen that delays in school enrollment and

Table 5: Repetition and Educational Progression

	Progression To Junior Secondary (N=484 children age 14 and above)	**Progression To Senior Secondary** (N=296 children age 17 and above)
Children's Characteristics		
Repeated grade at primary or JSS	-.894	-1.199
(Robust $\|z\|$-statistic)	(3.45)	(5.18)
Female	-.232	-.019
	(0.98)	(0.12)
Child's current age	5.139	7.565
	(3.19)	(1.30)
Age squared	-.259	-.356
	(3.27)	(1.31)
Age cubed	$.43 \cdot 10^{-2}$	$.55 \cdot 10^{-2}$
	(3.39)	(1.31)
Child's father in household	.472	.210
	(3.02)	(0.53)
Child is fostered	-.096	.309
	(0.56)	(0.74)
Woman's Characteristics		
Woman's Current Age	.012	-.010
	(2.31)	(0.51)
Not currently married	.258	.182
	(1.76)	(1.09)
Any primary school	-.178	.188
	(0.47)	(0.48)
Any middle or JSS	.458	.515
	(3.06)	(4.00)
Any senior secondary	1.138	1.447
	(8.08)	(21.72)
Household and Community Characteristics		
Household in poorest third	-.524	-.314
	(1.65)	(0.82)
Mankessim	.215	.436
	(4.13)	(4.70)
Takoradi	-.353	.383
	(3.46)	(2.59)
Torkuse	-.618	-.049
	(10.86)	(0.69)

Note: Constant term not shown.

grade repetition are likewise common (if not the norm) in southern Ghana, and the multivariate results indicate that these seemingly transitory events may well have important long-term effects on completed levels of schooling.

The effects seen in the schooling estimates may be causal in nature, or they may be signals of selectivity in unmeasured parental attitudes and perceptions. This distinction is of considerable importance in gauging the effects of alternative program interventions. If, for instance, late enrollment is due to parental skepticism about the value of schooling, one could imagine an campaign that engages and challenges such attitudes. If late enrollment is due to children's physical immaturity, and this is due, in turn, to poor health histories, then a different form of intervention could be contemplated. Whatever the source of the empirical associations, they are sufficiently large to be of substantive importance, and warrant closer study.

It is profitable to consider these findings in the broader context of the quantity-quality tradeoff, a familial and societal transition that begins with high fertility and low levels of schooling, and ends with low fertility and high levels of schooling. The most urbanized community in the study, the housing estates of Takoradi, is also the community with the highest levels of mistimed fertility. Here, one would not expect tightened resource constraints associated with mistimed births to bind more tightly than in the poorer communities of Abrafo-Odumasi, Torkuse, and Mankessim. But it may be that in Takoradi, parents are conscious of new needs in child-rearing, closely associated with children's schooling, that have the effect of raising the costs of children. These new costs may have prompted a rethinking of fertility decisions, causing parents to evaluate fertility control in a more conscious manner than would rural parents for whom child costs remain low. As in the case of Kenya studied by Montgomery et al. (1997), the fact that parents can label their fertility as mistimed may, in itself, reflect the new ways of thinking about fertility control and the heightened attention that some Ghanaian parents are giving to the costs of children. The patterns seen here in Takoradi may well become evident more widely in Ghana, as the society enters an era of higher child costs and downward pressures on fertility.

References

Montgomery, Mark R., Dominic K. Agyeman, Peter Aglobitse, and Tracyann Henry. 2000. "New elements in the costs of children: Supplementary schooling in Ghana." Policy Research Division Working Paper, The Population Council.

Montgomery, Mark R., Mary Arends-Kuenning, and Cem Mete. forthcoming. "The quantity-quality transition in Asia." *Population and Development Review* .

Montgomery, Mark R., Cynthia B. Lloyd, Paul C. Hewett, and Patrick Heuveline. 1997. “The consequences of imperfect fertility control for children’s survival, health, and schooling.” Demographic and Health Surveys Analytical Reports no. 7, Macro International Inc., Calverton, Maryland.